

## CLAIMS

What is claimed is:

1. An antenna having improved radio frequency (RF) signal transmission and reception capabilities, comprising:

a main reflector;

an antenna element;

a support tube disposed at said axial center of said main reflector for supporting said antenna element in facing relationship to said main reflector, said support tube having a plurality of apertures therein and

said apertures in said support tube serving to effectively reduce a dielectric constant of said support tube to thereby improve a signal strength of RF signals received by or transmitted from said antenna.

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2. The antenna of Claim 1, wherein said antenna element comprises a parabolic shaped sub-reflector, said sub-reflector aligned with said axial center of said main reflector.

3. The antenna of Claim 2, wherein said antenna includes a waveguide at an axial center of said main reflector.

4. The antenna of Claim 1, wherein said antenna element comprises a patch antenna, said patch antenna being able to relay RF signals to an input connector through a coaxial feed cable.

5. The antenna of Claim 1, wherein said apertures in said support tube are arranged in a plurality of columns circumferentially about said support tube.

6. The antenna of Claim 1, further comprising a support tube end cap for covering one end of said support tube.

7. The antenna of Claim 1, wherein said main reflector comprises a hyperbolic shaped main reflector.

8. The antenna of Claim 1, wherein said support tube includes a plurality of circular apertures.

9. The antenna of Claim 1, wherein said support tube comprises a plurality of radial slots.

10. The antenna of Claim 1, wherein said support tube comprises a plurality of longitudinal slots.

11. The antenna of Claim 1, wherein said support tube comprises a plurality of differing slot shapes formed therein.

12. The antenna of Claim 1, wherein said support tube comprises a plurality of differing hole shapes formed therein.

13. The antenna of Claim 1, wherein said support tube comprises a metallic material.

14. The antenna of Claim 13, wherein said metallic support tube functions as at least one of a spatial filter and a frequency selective surface.

15. A method for producing an antenna having improved transmission and reception characteristics comprising:

providing a main reflector;

disposing an antenna element in front of said main reflector and coaxially aligned with an axial center of said main reflector so as to face said main reflector; and

mounting said antenna element on a support tube having a plurality of openings formed therein so that radio frequency signals may pass more freely through the support tube without being reflected therefrom.

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16. The method of Claim 15, wherein the step of mounting said antenna element on a support tube comprises mounting said antenna element on a support tube having a plurality of circular apertures arranged in columns about the support tube.

17. The method of Claim 15, wherein the step of disposing an antenna element comprises disposing a sub-reflector in front of said main reflector.

18. The method of Claim 15, wherein the step of disposing an antenna element comprises disposing a patch antenna in front of said main reflector.

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19. A method for producing an antenna having improved transmission and reception characteristics comprising:

- providing a main reflector;
- disposing a waveguide at an axial center of said main reflector;
- disposing a sub-reflector in front of said main reflector and coaxially aligned with an axial center of said main reflector so as to face said main reflector; and
- mounting said sub-reflector on a support tube having a plurality of openings, wherein the apertures are spaced generally uniformly around the support tube, so that radio frequency signals may pass more freely through the support tube without being reflected therefrom.

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20. The method of Claim 19, wherein the step of providing a main reflector comprises providing a hyperbolic shaped main reflector.

21. The method of Claim 19, wherein the step of disposing a sub-reflector in front of said main reflector comprises disposing a parabolic shaped sub-reflector in front of said main reflector.

22. The method of Claim 19, wherein the step of mounting said sub-reflector comprises mounting said sub-reflector on a generally circular support tube, wherein said apertures are arranged in columns around said support tube.

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